



Build Your Own TurtleBot:

Power and Sensor Board

Written By: I Heart Robotics



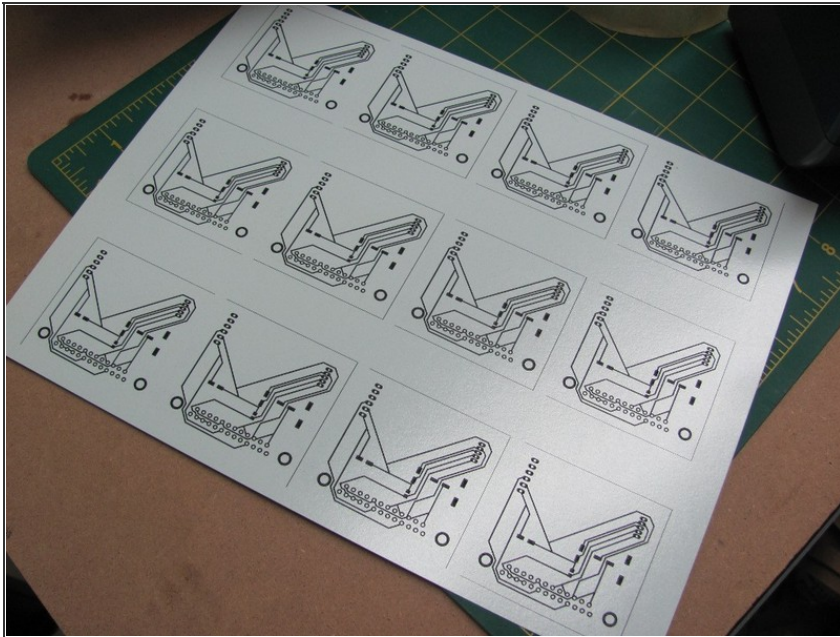
PARTS:

- [PCB Fab-in-a-Box Kit \(1\)](#)
- [IC REG LDO 1.5A 12V TO-220-5 \(1\)](#)
- [CONN DB25 MALE DIP SOLDER NICKEL \(1\)](#)
- [CONN HEADER 2POS RT ANG SMD TIN \(1\)](#)
- [CAP .10UF 50V CERAMIC X7R 0805 \(1\)](#)
- [CAP ALUM 10UF 25V 20% SMD \(2\)](#)
- [Breakaway male headers \(1\)](#)
- [Gyro Breakout Board - ADXRS613 \(1\)](#)
- [TO-220 heatsink \(1\)](#)
- [Silver Plating Powder \(1\)](#)

SUMMARY

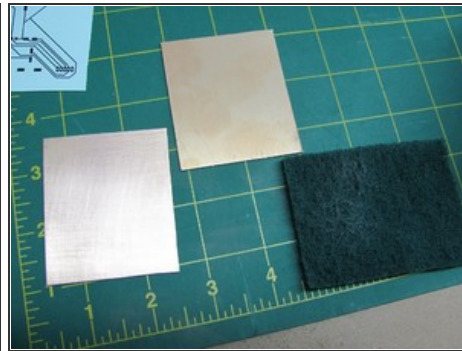
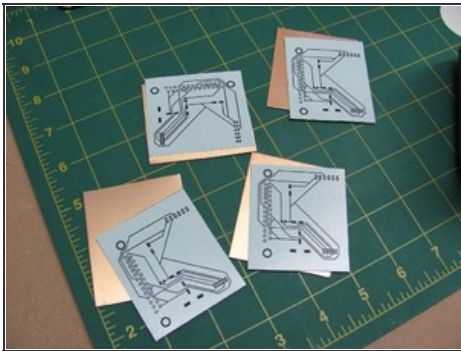
If you want to build a TurtleBot with a Kinect that is capable of navigation you are going to need a Power and Sensor board with a gyro. You can buy one or you can build one. In this project we are going to show you how to build one.

Step 1 — Build Your Own TurtleBot: Power and Sensor Board



- The circuit board files for Eagle (and soon KiCad) can be found [here](#).
- We used the Pulsar ProFX toner transfer system to etch the boards but any other etching system will work. First the design was laser-printed onto transfer paper, which is paper that has a coating that dissolves in water.

Step 2



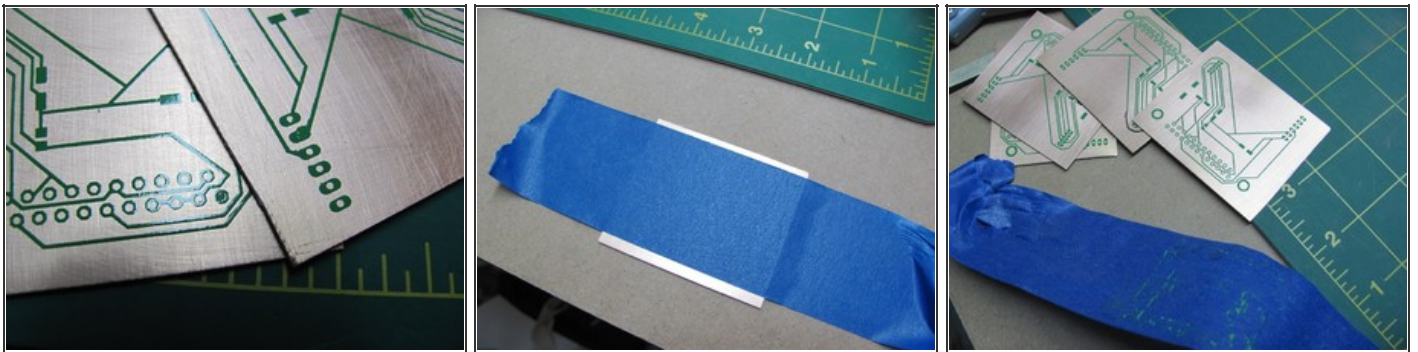
- Cut the single-sided copper boards to size.
- Lightly scrub and degrease the copper boards.
- Using a laminator, fuse the toner to the circuit board. After one pass, rotate the board 180 degrees and reinsert.
- The fusion process causes the toner to melt and adhere to the copper board.

Step 3



- Soaking the paper in water causes it to be released leaving the toner as a mask on the copper.
- The process we used has an additional transfer resist film that is applied via laminator.
- After cutting the film to size, the board is inserted into the laminator while the film is held flat. After the first pass the board is rotated 180 degrees and reinserted.

Step 4



- The film may leave extra resist on the board, as shown in the first photo with the clogged holes.
- A low-tack painter's tape is used to remove the excess resist.

Step 5



- There are many techniques for etching boards. This one is fast and is not too messy unless you spring a leak.
- Note: You need to remove the sharp edges of the circuit board before using this technique. A deburring tool is useful for this step. Also, you want to get high-quality reclosable plastic bags and perhaps double-bag it. You definitely need gloves; I suggest the black nitrile no-dust ones.
- SAFETY GLASSES ARE COOL!
- Put the circuit board and a small amount of ferric chloride in the plastic bag and gently rub the board.
- You can hold the bag up to a light to check if it is done etching. Once you are done you can recover the ferric chloride for recycling or proper disposal.
- Rinse the board clean.

Step 6



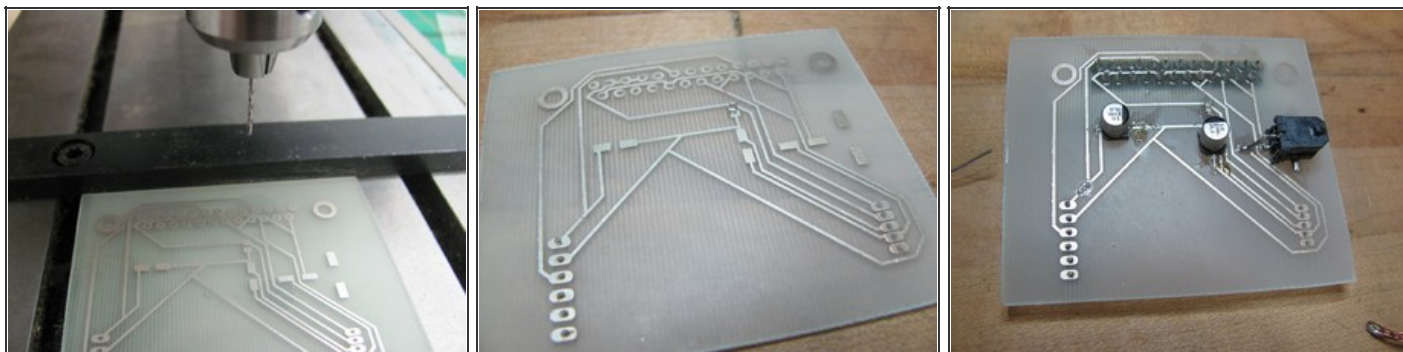
- The first photo shows the results and the total mess produced by this technique.
- To remove the resist soak the boards in acetone. Acetone is toxic and flammable so use caution and read the instructions and the MSDS. Other solvents may work but have not been tested.
- After briefly soaking the boards, wipe them clean with a paper towel and let dry.

Step 7



- Optionally a silver plating powder can be applied to improve conductivity, solderability and prevent corrosion.

Step 8



- Use a #63 or #64 drill bit to drill the holes in the board.
- A precision mini drill press works great. Another option that works well is a hand-powered drill that has a crank on the side and looks kind of like an egg beater.
- Once all the holes are drilled, attach all the surface-mount components. Most of these are pretty easy to hand-solder. There is one 0805 capacitor left as a challenge for the DIYer.

Step 9



- Attach all of the surface-mount components.
- Next, attach the DB25 connector and the pin header.
- The gyro is then soldered to the pin header from the bottom.
- The voltage regulator needs to be soldered on top but there is plenty of room so it should not be a problem.

After this project you will have completed the electronics portion of building a TurtleBot.

This document was last generated on 2012-11-03 01:29:53 AM.